

Advanced Insulation Techniques for Cryogenic Tanks, Phase I

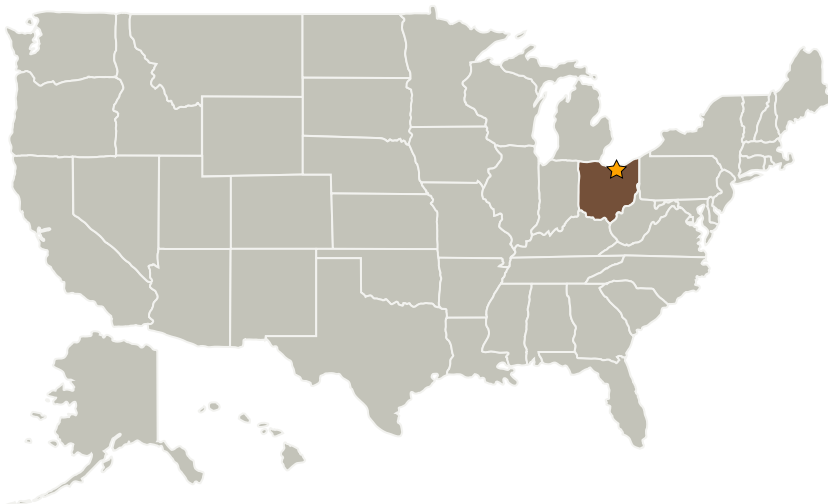
Completed Technology Project (2008 - 2008)



Project Introduction

The ability to store large amounts of cryogenic fluids for long durations has a profound effect on the success of many future space programs using these fluids for propellants, reactants, and life support systems. The high cost of delivering payload mass to orbit will require storage systems capable of limiting cryogenic losses due to boil-off to less than two percent per year for mission durations of up to ten years; or in some cases, completely eliminating boil-off losses. Although Multi-Layer Insulation (MLI) Systems have been extensively used to insulate cryogenic vessels in a space environment, it has been for short-duration missions that require from 30 to 50 layers to meet the mission requirements. Conversely, 150 layers or more of MLI will likely be needed to meet the requirements of future long-term missions. Limited data exists on the performance and physical characteristics of these thick MLI systems. A key opportunity relative to the development of advanced MLI insulation systems is identifying and analyzing concepts for minimizing heat-leak through seams and penetrations, which will be the major contributor to cryogenic losses for thick MLI systems. Sierra Lobo proposes to identify the more promising seam and penetration concepts, based upon previous research with the Missile Defense Agency, and to provide an analytical model to evaluate their performance.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

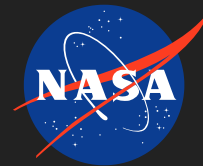
Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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| Organizations Performing Work | Role | Type | Location |
|-------------------------------|-------------------------|---|-----------------|
| ★ Glenn Research Center(GRC) | Lead Organization | NASA Center | Cleveland, Ohio |
| Sierra Lobo Inc. | Supporting Organization | Industry Small Disadvantaged Business (SDB) | |

Primary U.S. Work Locations

Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Robert Stochl

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.1 Cryogenic Systems
 - └ TX14.1.1 In-space Propellant Storage & Utilization